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ABSTRACT

This study examined sequential dependencies in behavior of 10 mother-infant dyads recorded when the infants were at 7 and 20 weeks of age in an effort to determine the extent to which individuals behave responsively to their partners during interactions. Ten maternal actions and 10 infant actions were selected in face-to-face interactions. Actions were selected on the basis of their relatively high frequency of occurrence and their assumed role in social interactions. Results showed that mothers were consistent in their selective responsiveness to infant acts, while infants showed little selectivity in their behavioral responses to maternal acts except at 20 weeks. (Author/SH)

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Sequential Dependencies in Mother-Infant Interactions[1]

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Abstract

Two fundamental questions for quantitative studies of social behaviour and development are: a) To what extent do individuals behave responsively to their partners during interactions? and b) How does this organization change ontogenetically? Sequential dependencies in the behaviour of ten mother-infant dyads recorded at 7 and 20 weeks of age were examined to address these questions. Mothers were found to be consistent in their selective responsiveness to infant acts. Infants show little selectivity in their behavioral responses to maternal acts except at 20 weeks. Most acts, however, were not responded to by the partner within 5 seconds.

Methods

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Sample: Ten mother-infant dyads were recorded on two different occasions during face to face interactions at 6-8 and 19-21 weeks post-partum. Recorded interactions averaged 21 minutes in duration. Video records were scored by computer (ACS™ software) making ten passes of each dyad on each visit. The brow, mouth, eyes of the mothers and physical contact by her (total = 33 maternal behaviour categories), and the brow, eyes, vocalizations, mouth, and emotional state of the infants (total = 32 infant behavioral categories) were scored. In total over 29,000 behavioral onsets were coded (N = 14,220 at 6-8 weeks; N = 15,143 at 19-21 weeks).

Statistical Analyses: Transitions between select acts (allowing a 5 second

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[1]Poster presentation, SRCD Seattle WA, April 1991.

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lag) were analyzed using BEAST™ software. The four matrices[2] of interest (baby to mom at ages 1 and 2; mom to baby at ages 1 and 2) were analyzed by performing two 3-D log-linear analyses. Separate χ^2 analyses were also performed on each of the four matrices. Conservative critical cell values were used for determining the significance of standardized residuals.

Results

Focal Behaviour

Analyses focused on 10 maternal actions and 10 infant actions selected on the basis of their relative high frequency of occurrence and their assumed role in social interactions (see Tables 1 & 2).

Maternal Responsiveness

Three-dimensional log-linear analyses suggested that a model with*out* a 3-way interaction (baby act x maternal response x age) could account for the observed data. No other factors could be omitted without significantly reducing the fit of the model.

Transition frequencies that differed significantly from those expected by chance from the 2 separate χ^2 analyses are summarized in Table 1.

Infant Responsiveness

Three-dimensional log-linear analyses suggested that the best model to account for infants responses to maternal actions was the simple additive model.

Transition frequencies that differed significantly from those expected by chance from the 2 separate χ^2 analyses are summarized in Table 2.

Discussion

Maternal Responsiveness. The lack of a 3-way interaction in maternal responses to infant acts at 7 and 20 weeks indicates that mothers are consistently selective in their responses to infant acts. The significant contributions of all 2-way interactions to the model indicates that the relative frequency of these acts differs between the two ages sampled and there is *a non-random association between infant acts and maternal*

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[2]Dyads were formed using several definitions to ensure the reported results were not unique to a specific methodology.

responses. Subsequent χ^2 analyses suggest this selective association between maternal responses and infant acts is stronger at 20 weeks than at 7 weeks. Most infant acts, however, are not responded to within 5 seconds. Infants' *Frowns*, *Knit Brows* and *Vocalizations* were not selectively responded to at either age.

Infant Responsiveness. A simple additive model accounts for the observed maternal act to infant response transitions, suggesting infants are not selective in the actions they display in response to the maternal behaviours examined at either age. The χ^2 analyses confirm this, with older infants showing some selective responsiveness. Infants did not selectively respond to maternal smiles or rocking at either age.

Summary

☐ Mothers were consistent in the selectiveness of their responses to infant acts.
☐ Only a small percentage of infant acts were responded to within 5 seconds.
☐ Mothers did not selectively respond to infant *frowns*, *brow raises* or *vocalizations*.
☐ Infants were not selective in their responses to maternal acts at 7 weeks.
☐ Infants became more selectively responsive by 20 weeks.
☐ Infants did not selectively respond to maternal *smiles* or *rocking*.
☐ Contingencies in mother-infant interactions were quite weak.

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Log-Linear Analyses

Infant Act to Maternal Response Matrices

Model Fitted[1]	χ^2	G^2	*d.f.*	*p*
A [12][13][23]	84.4	96.9	70	*n.s.*
B [12][23]	119.8	137.2	79	<.05
C [12][13]	128.4	147.2	79	<.05
D [23][13]	266.3	266.9	162	<.05
E [12][3]	165.0	194.5	88	<.05
F [23][1]	318.9	314.3	171	<.05
G [13][2]	333.5	324.3	171	<.05
H [1][2][3]	165.0	194.5	158	<.05

[1] 1 = Infant Acts, 2 = Maternal Responses, 3 = Age

Maternal Acts to Infant Response Matrices

Model Fitted[2]	χ^2	G^2	*d.f.*	*p*
A [12][13][23]	72.4	78.2	71	*n.s.*
B [12][23]	92.1	101.9	80	*n.s.*
C [12][13]	103.7	119.3	80	<.05
D [23][13]	187.5	197.1	162	<.05
E [12][3]	124.3	144.4	89	<.05
F [23][1]	211.3	222.2	171	<.05
G [13][2]	230.0	239.7	171	<.05
H [1][2][3]	124.3	144.4	160	*n.s.*
Comparisons		ΔG^2	*d.f.*	*p*
A versus B		23.7	11	<.05
A versus G		66.2	89	*n.s.*
B versus G		42.5	80	*n.s.*

[2] 1 = Maternal Acts, 2 = Infant Responses, 3 = Age

Table 1. Maternal Responsiveness to Select Infant Acts at 7 (Age 1) and 20 (Age 2) Weeks.

	Maternal Response											
		Physical Stimulation			Eyes	Look	Mouth		Brow		% Responded	
Infant Act	Speech	Rock	Caress	Poke	Brighten	Toward	Smile	Pucker	Smooth	Raised	Age1	Age2
Smile	.	.	.	+2	.	.	+1	.	.	+1-2	20	19
Frown	.	.	.	.	.	.	.	.	.	.	13	17
Neutral Mouth	+2	.	.	.	-1-2	.	.	.	+1	-2	14	15
Cry	.	.	.	.	.	.	.	.	.	.	9	20
Look Away	.	.	.	.	-2	.	.	+2	+2	-2	15	16
Look Toward	.	.	.	.	+1+2	.	-2	+1-2	-1-2	+2	16	22
Raised Brow	.	.	.	.	.	.	.	.	.	+1	20	20
Knit Brow	.	.	.	.	.	.	.	.	.	.	16	16
Smooth Brow	.	.	.	.	.	.	.	.	.	-2	14	17
Vocalize	.	.	.	.	.	.	.	.	.	.	14	14

+ denotes a significant positive *z*-score at age 1 (6-8 weeks) or age 2 (19-21 weeks)
- denotes a significant negative *z*-score at age 1 (6-8 weeks) or age 2 (19-21 weeks)
Total number of observed transitions: Age 1 $N=528$; Age 2 $N=681$
Age 1, $\chi^2=92$, $df=81$, $p>.1$; Age 2 $\chi^2=194$, $df=81$, $p<.001$; Log-linear analyses: *n.s.* 3-way Interaction.

Table 2. Infant Responsiveness to Select Maternal Acts at 7 (Age 1) and 20 (Age 2) Weeks.

	Infant Response											
		Mouth			Look		Brow				% Responded	
Maternal Act	Smile	Frown	Neutral	Cry	Away	Toward	Raised	Knit	Smooth	Vocalize	Age1	Age2
Speech	.	.	+2	.	.	.	.	.	.	.	11	12
Rock	.	.	.	.	.	.	.	.	.	.	12	17
Caress	.	.	.	.	.	+2	.	.	.	+2	14	21
Poke	.	.	.	.	.	.	.	.	+1	.	24	17
Eyes Brighten	+2	.	.	.	.	.	.	.	.	+1	12	26
Look Toward	.	.	.	.	−2	.	.	.	.	.	13	11
Smooth Brow	.	.	+2	.	.	.	.	.	.	.	14	14
Raise Brow	−2	.	.	.	+2	.	.	.	.	+1	17	23
Smile	.	.	.	.	.	.	.	.	.	.	11	19
Pucker Mouth	+2	.	.	+1+2	.	.	.	+1	.	.	15	22

\+ denotes a significant positive *z*-score at age 1 (6-8 weeks) or age 2 (19-21 weeks)
\- denotes a significant negative *z*-score at age 1 (6-8 weeks) or age 2 (19-21 weeks)
Total number of observed transitions: Age 1 $N=440$; Age 2 $N=562$
Age 1, $\chi^2=85$, $df=81$, $p>.25$; Age 2 $\chi^2=102$, $df=81$, $p=.05$; Log-linear analyses: all interactions *n.s.*